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Testing For A Descriptive And Injunctive Norm Interaction In Promoting Health Behavior

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Testing For A Descriptive And Injunctive Norm Interaction In
Promoting Health Behavior

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Testing For A Descriptive And Injunctive Norm Interaction In
Promoting Health Behavior

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— Robert Eric Low

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Abstract

Social norms-based interventions have demonstrated efficacy as tools for behavior change interventions. Nonetheless, there is some theoretical and empirical evidence that the efficacy of injunctive norms-based appeals can be undermined by their tendency to 1) arouse psychological reactance among participants, and 2) inadvertently imply that few others are completing the target behavior. The author hypothesizes that supplementing an injunctive appeal with evidence of a supporting descriptive norm will counteract these problematic tendencies. The present research describes a test of of this hypothesis in the context of an intervention to fight H1N1 on campus. Boxes of sanitizing keyboard wipes were placed in computer lab classrooms, accompanied by signs that independently manipulated descriptive and injunctive norms with the goal of increasing uptake of the wipes. Participants were University of Connecticut undergraduate students in 18 blocks of classes (study 1) and 20 class sections (study 2). For both studies, an analysis of variance showed no significant effect of either norm manipulation on wipe uptake, and no significant interaction between norm manipulations. Pooling the data from both studies, however, revealed a marginally significant interaction between injunctive and descriptive norms. Possible explanations and implications are discussed.

Keywords: norms, descriptive, injunctive, reactance, intervention, H1N1

Social norms are perceptions of other peoples' actions and opinions (Ajzen, 1991; Fishbein & Ajzen, 1975). Specifically, the Focus Theory of normative conduct (Cialdini, Reno, & Kallgren, 1990) asserts that there are two types of norms. The descriptive norm consists of a perception of what other people commonly do, and is thought to guide action by indicating which behaviors are likely to be effective or safe in a given situation. The injunctive norm consists of a perception of what other people commonly approve of or think should be done, and is thought to guide action by indicating which behaviors are likely to be met with social sanctions. The independent effect of each type of social norm is well tested and has been demonstrated with a diverse array of behaviors, such as sunscreen use (Mahler, Kulik, Butler, Gerrard, & Gibbons, 2008), healthy eating (Burger, et al., 2010), college drinking (Berkowitz, 2004), voting (Gerber & Rogers, 2009; Glynn, Hogue, & Lunney, 2009), electricity usage (Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007), littering (Reno, Cialdini, & Kallgren, 1993), hotel linen re-use (Goldstein, Griskevicius, & Cialdini, 2007), and theft (Cialdini, 2003).

Theoretical Concerns

In spite of the potential and demonstrated utility of social norms as an intervention tool, there is reason for concern that the efficacy of norms-based strategies may be undermined in two possible ways.

First, there is evidence that injunctive norms are associated with the phenomenon of psychological reactance. Reactance is defined as an aversive psycho-emotional state that is created in response to a perceived threat to behavioral freedom, and which motivates actions to restore freedom (J. Brehm, 1966; S. Brehm & Brehm, 1981). In the

context of an intervention, reactance can cause the participants to act in ways directly opposite the intended direction of behavior change. In addition, reactance is associated with counter-arguing (R. E. Petty & Cacioppo, 1979) as well as decreased message scrutiny and cognitive elaboration (Werner, Stoll, Birch, & White, 2002). This phenomenon has been identified as a barrier to persuasion and behavior change in research on littering, antipollution, sales (S. Brehm & Brehm, 1981), and as a barrier to health behaviors including cancer screening (Orbell & Hagger, 2006), spousal support for coping (Martire, Stephens, Druley, & Wojno, 2002), and smoking prevention among adolescents (Miller, Burgoon, Grandpre, & Alvaro, 2006).

As a barrier to health behavior change, reactance may be especially problematic for injunctive-norms based interventions. Brehm (1966) asserted that greater pressure to comply elicits greater levels of reactance. Thus, to the degree that the suggestion of injunctive norms constitutes pressure, reactance may undermine intervention efficacy. Some recent evidence supports this concern. A study of smokers in Mexico and Uruguay, for instance, found that reactance against anti-secondhand smoke messages was positively correlated with societal antismoking norms (Thrasher, Boado, Sebríé, & Bianco, 2009). Moreover, one experiment on college-age binge drinkers found that injunctive norm based anti-drinking messages created a state of reactance, which in turn increased positive attitudes toward binge drinking and intentions to binge drink (Jung, Shim, & Mantaro, 2010). Given this correlational and experimental evidence suggesting the tendency of injunctive norms to elicit reactance, a strategy to reduce reactance may thus be able to enhance the efficacy of an injunctive norms-based intervention.

A second way in which the efficacy of injunctive-norms based interventions could be undermined is by the tendency of persuasive appeals to imply an undesirable descriptive norm. That is, asking people to do something can inadvertently betray a concern that most people are not doing it. Hall and Blanton (2009) found that student-written messages encouraging a behavior decreased participants' perceptions of the behavior's prevalence (study 1), and that this effect accounted for lowered intervention efficacy with regards to abstinence (study 2) and hand-washing (study 3). Although this effect only emerged for positive message frames (encouraging a desired behavior) and with speakers possessing normative expertise, each of these is a valuable intervention tool—positive message frames are especially effective for encouraging prevention behavior (Rothman & Salovey, 1997), and expert speakers can elicit a high degree of compliance (Cialdini, 2000; Zanna, Olson, & Herman, 1987). It would therefore be useful to develop a strategy that allows the use of these techniques without the inadvertent implication of an undesirable descriptive norm.

Descriptive norms as a solution

Descriptive norms may in fact hold the key to enhancing the efficacy of injunctive norms by preventing reactance and inadvertent implications. Preventing the implication of an undesirable descriptive norm, for instance, may be as simple as providing evidence to the contrary (see Figure 1). With regards to reactance, an analysis of Brehm's model (1966) suggests two moderators that might be addressed by a manipulation of descriptive norms (see Figure 2).

The first of these moderators is the perceived legitimacy of the threat to freedom. More reactance will be aroused when the threat to freedom is perceived as lacking in legitimacy. A command or request issued that is issued with just cause will elicit less reactance than one that appears unjustified. This suggests that reducing reactance in the context of an intervention might be accomplished by increasing the perceived legitimacy of the intervention. One way to accomplish this might be to establish a descriptive norm to support the intervention by drawing attention to the compliance of others—evidence that most other people have complied with the intervention could be construed as a tacit endorsement of the intervention's legitimacy. Indeed, one study showed that others' compliance with a confederate's requests can serve as evidence for the legitimacy of a hierarchy or a member thereof (Ridgeway, Diekema, & Johnson, 1995).

A second moderator of the reactance effect is the importance of the threatened freedom to the individual (J. Brehm, 1966). That is, the prospect of losing a particular freedom is less likely to bother a person who does not value it to begin with. This suggests that reducing reactance in the context of an intervention might be accomplished by decreasing the perceived value of the unhealthy behavior or choice. Establishing a descriptive norm to support the intervention may be useful to this end as well. Evidence that other people do not value (and have therefore relinquished) a given freedom may lower an individual's valuation of the same, and therefore lower his or her reactance when it is threatened. There is some evidence that one's value judgments can be influenced in this way. One study found that others' ratings of the value of a target object affected not only participants' ratings of the same, but also their neural activation corresponding to value computation (Zaki, Schirmer, & Mitchell, 2011). Another study

found that male college students' shifted their own attitudes toward drinking to match their perception of their friends' attitudes toward drinking (Prentice & Miller, 1993).

The proposed use of descriptive norms to decrease reactance represents a novel intervention approach. Whereas most norms-based interventions aim to change perceptions of the prevalence or acceptability of a target behavior, we propose the provision of descriptive norm evidence as a means to change perceptions of the intervention itself. By increasing the degree to which the message seems legitimate, and decreasing the degree to which the message appears to threaten a valued freedom, we suggest that descriptive norms can prevent potential negative reactions to an intervention, and thus increase compliance beyond merely exerting a direct effect on behavior. This perspective is similar to the notion of source credibility within the framework of the Elaboration Likelihood Model (Richard E. Petty & Cacioppo, 1986), yet it differs in terms of its intended mechanism (decreasing reactance rather than increasing cues for peripheral-route attitude change) and to our knowledge descriptive norm evidence has not been suggested as a manipulation of credibility.

Hypotheses

To review briefly, injunctive norms-based interventions have demonstrated efficacy, yet may be undermined to some degree by 1) creating reactance and 2) by inadvertently implying an undesirable descriptive norm. Providing evidence of a desirable descriptive norm may help to prevent the former by increasing the perceived legitimacy of the intervention and decreasing the perceived value of the unhealthy alternative, and the latter by directly contradicting the inadvertent implication. The

present research is therefore conducted with the hypothesis that combining an injunctive norm message with a descriptive norm message will produce an additive interaction, whereby the resulting change in behavior will be greater than the mere sum of each norm's individual effect.

Surface Hygiene as an intervention target

The goal of the current research is to test these hypotheses in the context of an intervention to promote surface hygiene in the classroom, and thus protect against the transmission of H1N1 and other pathogens between students. Surface hygiene, the cleaning and sanitization of objects and surfaces with which one interacts, is important in fighting the spread of certain illnesses. Previous research has identified harmful bacteria and viruses on many public objects and surfaces (Bright, Boone, & Gerba, 2010; Brooke, Annand, Hammer, Dembkowski, & Shulman, 2009; Dieuleveux, Collobert, Dorey, & Guix, 2005; Rusin, Orosz-Coughlin, & Gerba, 1998). These pathogens can transfer to and between people (Rheinbaben, Schünemann, Groß, & Wolff, 2000; Sattar, et al., 2001; Scott & Bloomfield, 1990), thereby causing and spreading illness (Gwaltney Jr & Hendley, 1982; Gwaltney Jr, Moskalski, & Hendley, 1978).

Interventions to promote hand and surface hygiene are often successful in reducing illness (Aiello, Coulborn, Perez, & Larson, 2008; Larson, Early, Cloonan, Sugrue, & Parides, 2000; Meadows & Saux, 2004; Rabie & Curtis, 2006), and some research indicates that there may be a special need for such interventions in the context of university computer labs and computer-based classrooms. Infectious bacteria and viruses have been identified on the keyboards of public computers in hospitals (Lu, et al., 2009),

elementary schools (Bright, Boone, & Gerba, 2010), and college campuses (Brooke, Annand, Hammer, Dembkowski, & Shulman, 2009). University computer labs may be particularly dangerous, and have been found to harbor several strains of drug-resistant staphylococcus (Kassem, Sigler, & Esseili, 2007).

Alcohol-based sanitizing wipes are effective against these pathogens (Jones, Rowe, Jackson, & Pritchard, 1986), however baseline rates of use with other sanitizing products are low (Anderson, et al., 2008; Foster & Clark, 2008). Thus, the provision of sanitizing materials must be accompanied by an intervention to encourage their use in maintaining surface hygiene. Given that social norms have been found to be a particularly important determinant of hand hygiene behavior (Tai, Mok, Ching, Seto, & Pittet, 2009), a social norms-based intervention for surface hygiene promises to further the dual goals of protecting student health and testing our hypotheses regarding the interaction between descriptive and injunctive norms.

Study 1: Pilot Study

The goal of the pilot study was to evaluate our hypotheses in the context of a classroom-based intervention to promote hand and surface hygiene, while limiting the presence of experimenters (and therefore disruption of class activities) to an absolute minimum. This study was meant to provide a preliminary demonstration of the intervention's feasibility, acceptability, and efficacy, and thereby justify the increased resources and potential disruption of a college class that would be necessitated by a full-scale experiment. In addition, we wanted to identify potential problems such as floor or ceiling effects, complaints from instructors, or theft of materials. To address these

questions, we placed boxes of sanitizing keyboard wipes in computer labs used for classes at the University of Connecticut, accompanied by signs meant to establish descriptive and injunctive norms supporting the use of the wipes.

Method

Participants. For the pilot study, participants were undergraduate students enrolled in 61 sections of an introductory psychology class at the University of Connecticut (each section is a separate group of approximately 20 students). The students encountered the experimental materials (described below) in the context of attending class as usual. In order to avoid inducing demand characteristics and self-presentation bias, and with prior approval of the UConn IRB, we did not make students aware that they were participating in a research study.

Materials. Experimenters equipped each of the four classrooms in which the 61 sections of the course met with two boxes of individually packaged, sanitizing keyboard wipes. The wipes were placed on a small folding table by the door, positioned such that participants walked past them before sitting down at the computers (see Figure 3). In addition, the experimenters placed two 8" x 10" standup signs on the table on either side of the wipes. These signs corresponded to the descriptive and injunctive norm manipulations, respectively. Each sign had two possible versions, which allowed for the independent manipulation of the two norms as a 2x2 experiment.

The descriptive norm sign depicted one of two versions of an ostensibly official message from the UConn Psychology Department. The experimental version of the message established a **descriptive norm** by suggesting that many people had been using

the wipes (see Figure 4). It said: “Due to the high usage of the New Keyboard Wipes we have arranged for daily refills; however, if you should find a dispenser empty please email robert.low@uconn.edu for immediate refill. Thank you!” The control version of the message merely acknowledged the presence of the wipes, but was otherwise as similar as possible: “Please enjoy the New Keyboard Wipes that we have provided for your convenience. Thank you!” In addition to the signs, the descriptive norm was also manipulated through the number of wipes present in the boxes. When the sign suggested the presence of a descriptive norm, the box was left half full. When the sign did not suggest the presence of a descriptive norm, the box was left full. The boxes were checked and refilled multiple times per day in order to maintain the proper experimental condition.

It should be noted that the researcher chose a somewhat indirect method of communicating a norm, whereas many norms-based behavior change interventions simply advertise a statistic (Agostinelli, Brown, & Miller, 1995; Haines & Spear, 1996; Neighbors, Larimer, & Lewis, 2004; Perkins, 2002; Wechsler, et al., 2003). One campaign to reduce drinking on campus, for instance, informed participants that 68% of students had two drinks or less in an average week (Walters, 2000). While widely used, however, there is some evidence the effectiveness of this method is contingent upon the believability of the message (Thombs, Dotterer, Olds, Sharp, & Raub, 2004). Given that the true rate of use of the wipes is unknown, and likely to be low given baseline use observed for other sanitizing products (Anderson, et al., 2008; Foster & Clark, 2008), we chose an indirect method of implying the presence of a norm. Furthermore, other studies have found success using indirect methods of communicating descriptive norms, such as

whether the bathroom lights are on or off (Oceja & Berenguer, 2009), and the presence of litter (Cialdini, et al., 1990) or food wrappers (Burger, et al., 2010).

The injunctive norm sign presented one of two versions of a conversation between two doctors from the television show “Scrubs,” portrayed through word bubbles above a picture of the characters (see figure 5). In the experimental version, the conversation suggested approval for the wipes:

Perry: “You remembered to wipe down your keyboard, right newbie?”

JD: “Pssh, of course! Clean keys is... the way to be?”

Perry: “Right, let’s both just pretend you never said that...”

In the control condition, the conversation merely pointed out the presence of the wipes but was otherwise as similar as possible:

Perry: “Did you see the new keyboard wipes, newbie?”

JD: “Umm... kinda like the ones right next to us?”

Perry: “Kinda like... your face! ...Get back to work!”

The unconventional style of the injunctive norm sign was a deliberate choice intended to avoid a “floor effect”—a concern raised by the low baseline use of other sanitizing products observed in previous research (Anderson, et al., 2008; Foster & Clark, 2008). First, experimenters included humor in the conversation because the Focus Theory of social influence suggests that social norms are influential to the degree that they are salient (Cialdini, et al., 1990), and humor has been found to increase both the salience of a message (Weinberger & Gulas, 1992) as well as its overall effectiveness (Eisend, 2009; Weinberger & Gulas, 1992). Second, fictional characters from a popular TV show (ABC, 2009; *Nielsen's TOP 156 Shows for 2002-03*, 2003) were selected because a long history of research supports the effectiveness of celebrities in advertising (Erdogan, 1999), particularly with younger people (Atkin & Block, 1983), and especially when there is a

logical connection between the celebrity (doctors) and the use of the product (fighting disease) (Erdogan, 1999).

Design. The descriptive and injunctive norm manipulations served as the independent variables, and each had two levels corresponding to the two versions of the signs (experimental and control). These were crossed in a 2x2 design, yielding four conditions:

1. *Control* (control-version descriptive sign, control-version injunctive sign)
2. *Descriptive-only* (experimental-version descriptive sign, control-version injunctive sign)
3. *Injunctive-only* (control-version descriptive sign, experimental-version injunctive sign)
4. *Descriptive-injunctive* (experimental-version descriptive sign, experimental-version injunctive sign).

In order to minimize experimenters' intrusion into the classroom, the 61 class sections were divided into 18 groups, or blocks, based on the times at which experimenters could access the classrooms. Since these times occurred at irregular intervals, the number of class sections in each block ranged 1 section (with 12 students) to 8 sections (with a total of 179 students). Each block was randomly assigned to one of the four conditions.

Procedure. During each block, participants entered the classrooms, the class was held as normal, and the participants left. The instructors were aware of the experiment, however no special instructions were issued to the students, and the only difference from a normal day of class was the presence of the signs and the availability of the wipes. Between each block the experimenter entered the classrooms, arranged the materials to reflect the condition randomly assigned to the next block, and counted the number of

wipes used by the previous block. The dependent variable was calculated as the number of wipes used during a block divided by the number of students enrolled in that block.

Results and Discussion

In the course of a week, 408 wipes were taken. Based on the enrollment of 695 people in the classes that encountered the intervention, we estimate that 0.587 were taken per person. The intervention proved to be both feasible and acceptable. There were no negative reactions reported from either students or teachers, and no adverse events arose during the course of the intervention. The use of the wipes did not cause any visible disruption to the class or damage to the computer equipment, nor was there any littering of the wipes or theft of experimental materials.

Data Analysis. A two-way between subjects ANOVA ($N=18$ blocks) was conducted to examine the effect of descriptive norms and injunctive norms on wipe uptake. Since wipe uptake was positively skewed, we calculated its natural logarithm to use as an outcome variable (Cohen, Cohen, West, & Aiken, 2003). There was no significant effect of descriptive norm on wipe uptake, $F(1, 14) = .008$, $p = .930$, and there was no significant effect of injunctive norm on wipe uptake, $F(1, 14) = .582$, $p = .458$. Also, there was no significant interaction between the effects of the two types of norms on wipe uptake, $F(1, 14) = 1.435$, $p = .251$.

The 18 blocks of participants did not provide enough power to detect statistical significance. Nonetheless, the differences between conditions do suggest the potential for efficacy given a larger sample size (see Figure 6). Relative to the control condition, the injunctive-only condition displayed a 61% increase in wipe uptake, and the descriptive-

only condition displayed a 299% increase. Interestingly, the descriptive-injunctive condition displayed a 54% *decrease* in wipe uptake, which is the direct opposite of our hypothesized additive interaction.

Discussion. The results of study 1 did not support any of our initial hypotheses. Our confidence in this conclusion, however, was undermined to some degree by two methodological issues that may have lowered the precision of the manipulation and measurement. First, the blocks were of uneven sizes. While the dependent variable was calculated as the number of wipes taken per person in order to avoid a biased measurement, it is possible that the manipulation was inadvertently biased. The boxes of wipes would tend to become more depleted through the course of a large block, which participants in later classes may have interpreted as evidence of a supporting descriptive norm. This effect could mask a difference between conditions by causing the control and injunctive-only conditions to seem more similar to the descriptive-only and descriptive-injunctive conditions.

In addition, since wipe uptake was measured at the block level instead of the individual level, it is possible that some participants took more than 1 wipe. In fact, the entire apparent depletion of wipes in a given block could be due to the actions of a single participant. Depending on the distribution of such individuals across conditions, this possibility could either exaggerate or mask the differences between conditions, or have no effect. A second study was called for to provide more firm conclusions by resolving these ambiguities in manipulation and measurement, and to further explore the previously mentioned pattern of results.

Study 2: Full Intervention Test

The goal of this study was to collect additional data in order to further investigate the hypotheses stated earlier, as well as the intervention's potential for efficacy. In addition, we wanted to improve the measurement technique in order to address the ambiguity in interpretation of the pilot study's results. We thus conducted a second test with similar methods, a larger sample, and individual-level observation.

Methods

Participants. For study 2, participants were 366 undergraduate students in 20 sections of a single large introductory psychology class at the University of Connecticut, in the Spring of 2011. Study 2 was again conducted in a computer lab. To our knowledge, no students participated in both studies 1 and 2.

Materials. The experimental materials that were used in study 2 were the same as in study 1.

Design and Procedure. The design and procedure used in study 2 was identical to those used in study 1, with the exception of two changes that were intended to address the previously-mentioned problems with study 1. First, in order to prevent any bias resulting from large block sizes, we did not group the class sections into blocks. Experimenters entered the classrooms every hour, following each class section, in order to manipulate the conditions between each class section. A more frequent refilling of the boxes of wipes was meant to prevent the prolonged depletion of wipes and consequent suggestion of a descriptive norm beyond that which we intended to communicate through

the manipulation. The unit of randomization, manipulation, measurement, and analysis was thus a single class section instead of a block of class sections.

Second, in order to prevent bias resulting from participants' taking more than one wipe, we supplemented the measure of wipes taken with a measure the number of participants who took a wipe. We observed this by recording video footage in real time of the classes and coding whether or not each participant took a wipe. We calculated the outcome variable, wipe uptake, as the percent of students within a class section who took a wipe. Thus, even if a participant did take more than one wipe, he or she would only be counted once. We also made provisions to assess the validity of this concern by measuring the number of wipes taken after each class section.

Results and Discussion

Across all class sections, a total of 22 wipes were taken, and 22 people (out of 366) took wipes. Furthermore, within each class section the number of wipes that were taken matched the number of people who took wipes. While we cannot say for sure that the same was true of study 1, this provides some evidence to allay our concerns that the wipe uptake observed in study 1 was inflated or biased due to a handful of participants taking a large number of wipes.

A two-way between subjects ANOVA ($N=20$ class sections) was conducted to examine the effect of descriptive norms and injunctive norms on wipe uptake. Since wipe uptake was positively skewed, we calculated its natural logarithm to use as an outcome variable. There was no significant effect of descriptive norm on wipe uptake, $F(1, 16) = .002$, $p = .968$, and there was no significant effect of injunctive norm on wipe uptake, $F(1,$

16) = .466, $p = .505$. Also, there was no significant interaction between the effects of the two types of norms on wipe uptake, $F(1, 16) = 2.039$, $p = .172$.

The results of study 2 did not support any of our hypotheses. Interestingly, however study 2 produced the same pattern of statistically-insignificant results as study 1 (see Figure 7). Relative to the control condition, increases in wipe uptake were observed in the injunctive-only (76%) and descriptive-only (187%) conditions, and a decrease was observed in the descriptive-injunctive condition (−45%).

We evaluated the consistency of this pattern by analyzing the data from both studies together, which we believe is justified given that both studies were identical in terms of location, materials, population, and sampling procedure (Curran & Hussong, 2009; Curran, et al., 2008). To accomplish this, we pooled the data from studies 1 and 2 into a single set, added a variable to signify which study each observation corresponded to, and calculated wipe uptake as the number of wipes taken divided by the number of participants. We used this outcome variable for our analyses because it was measured in both studies, and because in study 2 we found it to be equivalent to the percent of students who took wipe.

A full factorial ANOVA on the pooled data ($N=38$) indicates that the pattern is indeed stable between studies—study (1 vs. 2) does not interact with the effect of descriptive norm, $F(1, 30) = .004$, $p = .951$; or injunctive norm, $F(1, 30) = .138$, $p = .713$; or interaction between norms, $F(1, 30) = .166$, $p = .687$. In addition, a univariate ANCOVA on the pooled data ($N=38$) controlling for study number indicates what appears to be a marginally-significant crossover interaction, $F(1, 33) = 3.676$, $p = .064$. This test did not find a significant main effect of injunctive norm on wipe uptake, $F(1,$

33) = 1.207, $p = .280$, or a significant main effect of descriptive norm on wipe uptake, $F(1, 33) = .006$, $p = .940$.

General Discussion

A stable pattern of interaction

Neither study 1 nor study 2 supported our hypotheses regarding the main effects and interaction of injunctive and descriptive norms. When we pooled the results from both studies, we found a marginally-significant crossover interaction that was stable across studies. Although these analyses cannot provide the basis for any firm conclusions, they do invite speculation as to why the two norms might interact in such a way that each cancels out the effect of the other.

One possibility is that suggesting a descriptive norm on top of an injunctive norm increased reactance, rather than decreasing it as intended. This notion emerges from a consideration of the intervention's implications for participants' self-identities. Blanton and Christie's Deviance Regulation Theory (2003) asserts that 1) people tend to behave in ways that allow them to form positive self-identities, and tend to avoid behaving in ways that lead to the formation of negative self-identities; and 2) people derive an important part of their self-identities from the ways in which they are different from others. Behavior change appeals should therefore focus on defining the identity consequences of the behavioral alternative that is less common. If most people are performing a healthy behavior for instance, an intervention ought to suggest that not performing that behavior is socially undesirable (Blanton & Christie, 2003).

If people are accustomed to encountering this pairing of identity-threatening appeal and perception of others' compliance, however, it is possible that providing evidence of others' compliance could cause an otherwise ambiguous appeal to appear threatening by mere association. Although our manipulation of injunctive norms was meant to express approval for taking a wipe, participants who were made to believe that most people were already taking a wipe may have seen it as threatening disapproval and a negative identity as a consequence of not taking a wipe.

This could be problematic, as there is reason to believe that that threatening negative consequences can produce more reactance than promising positive consequences. From a theoretical standpoint, the degree of reactance aroused by a given threat to freedom can be increased by the presence of other, associated threats (J. Brehm, 1966). One study on health communications demonstrated this effect empirically, and reported that loss-framed messages encouraging organ donation produced more reactance, and thus lower intentions to donate, than did gain-framed messages (Reinhart, Marshall, Feeley, & Tutzauer, 2007).

Alternatively, the descriptive norm manipulation may have failed to counteract the inadvertent implications caused by the injunctive norm manipulation, and possibly undermined its efficacy even further. That is, the notion that people were using the wipes may have seemed inconsistent with the apparent fact that the psychology department had gone to the trouble of mounting an intervention encouraging people to use the wipes. This, in turn, may have aroused suspicion of the descriptive manipulation norm and the intervention in general.

Though this notion is largely unexplored, there is some theoretical and empirical evidence to suggest that creating suspicion of an intervention could greatly decrease compliance. The Network-Individual-Resource model (Johnson, et al., 2010), for instance, specifies that at both an individual and network level, the success of an intervention is limited by the population's trust in its efforts. We are aware of one study that demonstrates this effect. After an ineffective intervention to reduce college binge drinking, the authors found a correlation between students' trust in the intervention and their drinking levels (Thombs, et al., 2004).

Further research is needed to distinguish between these two hypothesized explanations, as the current research does not provide the means to do so. A future study might again manipulate both descriptive and injunctive norms in an intervention context, but should take care to measure participants' state reactance, feelings of being threatened by the intervention, perceived legitimacy of the intervention, trust in the intervention, and perceived descriptive norm. Measuring these mediator variables would allow the researcher to determine which of the hypothesized process or combination of processes, if any, is at play.

Research to this end is valuable in its potential to guide the effective use of norms as intervention tools. For instance, confirming that the combination of descriptive evidence and injunctive appeal increase reactance would warn against using this combination of norm manipulations, and possibly shed light on how they might be combined in different ways to produce the desired effect. Likewise, understanding whether and how combining norms can undermine trust in an intervention may point to strategies by which this inadvertent effect can be avoided.

Decrease in compliance between studies

A second striking feature in the results is the decrease in wipe uptake between study 1 and study 2. Approximately 408 wipes were used between 695 people in study 1, and approximately 22 wipes were used between 366 people in study 2—nearly a ten-fold decrease in wipes per person. This is surprising, considering the similarity between studies in terms of location, population, materials, and procedure. One possible explanation is a difference in levels of pre-existing concern for preventing illness.

We conducted Study 1 in the Spring of 2010 as a response to the H1N1 pandemic that occurred in the Winter of 2009-2010 (Dawood, et al., 2009; Yang, et al., 2009). During this period, the United States Centers for Disease Control and Prevention declared a state of public health emergency ("2009 H1N1 Flu," 2009). Many Americans (59-67%) reported that they or someone in their family had begun washing or sanitizing their hands more frequently (SteelFisher, Blendon, Bekheit, & Lubell, 2010), and sales of sanitizers and other influenza-fighting products rose by \$25-30 million (Neff, 2009). By the time we conducted Study 2 in the Spring of 2011, however, it is likely that much of the worry about the illness had dissipated. As seen in Figure 8, Google searches for "swine flu" and "H1N1" during March and April decreased 74% from 2010 to 2011 (Google, 2011).

Future research on social norms in health behavior change might benefit from exploring this possible interplay. Such research might apply social norms-based manipulations to a variety of health behaviors while independently manipulating participants' awareness of and concern for the health risk that the behavior addresses. Evidence for an interaction between these two manipulations would be useful in guiding

the use of norms-based appeals as behavior change tools. For instance, it could suggest social norms as a particularly effective tool in promoting health behaviors characterized by high levels of awareness, such as encouraging the uptake of influenza vaccination during seasonal pandemics. Alternatively, it could suggest that a norms-based intervention include components to emphasize awareness and concern for the relevant health behavior or risk.

Limitations

The external validity of our results is limited by the small sample size of our studies as well as our reliance on a population of undergraduate students at the University of Connecticut. It is also possible that the internal validity of our studies was undermined by a diffusion of treatment. That is, if participants from one class section were discussing their experiences with participants in other class sections, some may have been influenced to either take or not take a wipe

In addition, while the field setting and unobtrusive observation allowed for the maximization of ecological validity, it did not allow for a manipulation check or the measurement of mediating variables. Thus, further research is needed to test these speculative explanations of the trending interaction and decrease in wipe uptake between studies, as well as to further explore the possibility that combining norm manipulations has a counter-productive effect. To our knowledge, no other studies have reported this pattern of results. A detailed understanding of how descriptive and injunctive norms interact, as well as when to expect them to produce the desired effect, will aid in development of effective norms-based interventions for health behavior change.

Conclusion

Although we argued that the efficacy of injunctive norms as an intervention tool may be undermined by its inadvertent implications and by arousing reactance, and that this might be remedied by providing evidence of a supporting descriptive norm, we did not find evidence for our hypotheses. Given the lack of intervention efficacy and the tenuous evidence of crossover interaction, we do not recommend that this intervention be used in the future. Instead, we recommend that interventionists and health behavior researchers exercise care when using social norms-based intervention techniques, and pursue further research to identify whether and how injunctive and descriptive norms might be used effectively in combination.

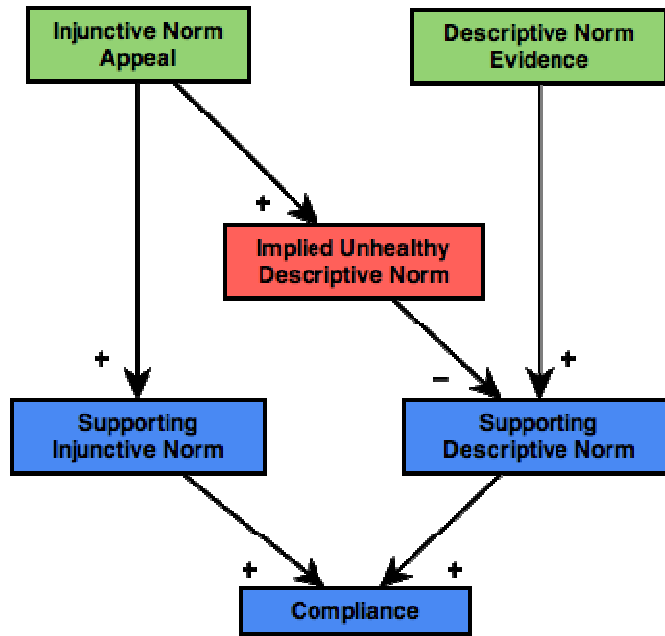


Figure 1: An intervention may encourage compliance by suggesting a supportive injunctive norm, but can decrease compliance by inadvertently implying an undesirable descriptive norm (figure based on Hall & Blanton, 2009). The inclusion of evidence of a supporting descriptive norm is needed to counteract this effect.

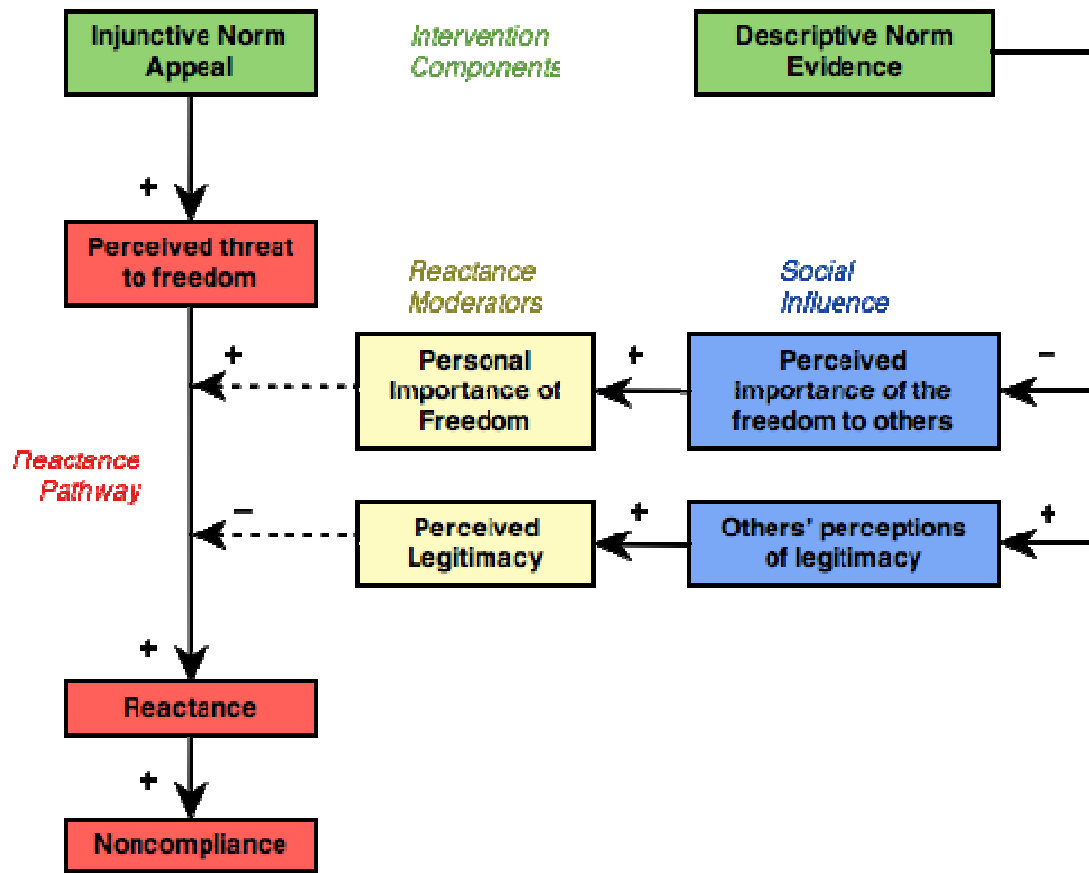


Figure 2: An injunctive norm appeal can create reactance, which reduces compliance. This effect is moderated by the degree to which an individual values the unhealthy alternative and by the degree to which an individual perceives the appeal to have a legitimate basis (figure based on J. Brehm, 1966). Providing evidence of a descriptive norm that supports the appeal may increase compliance and reduce reactance by harnessing its moderators.

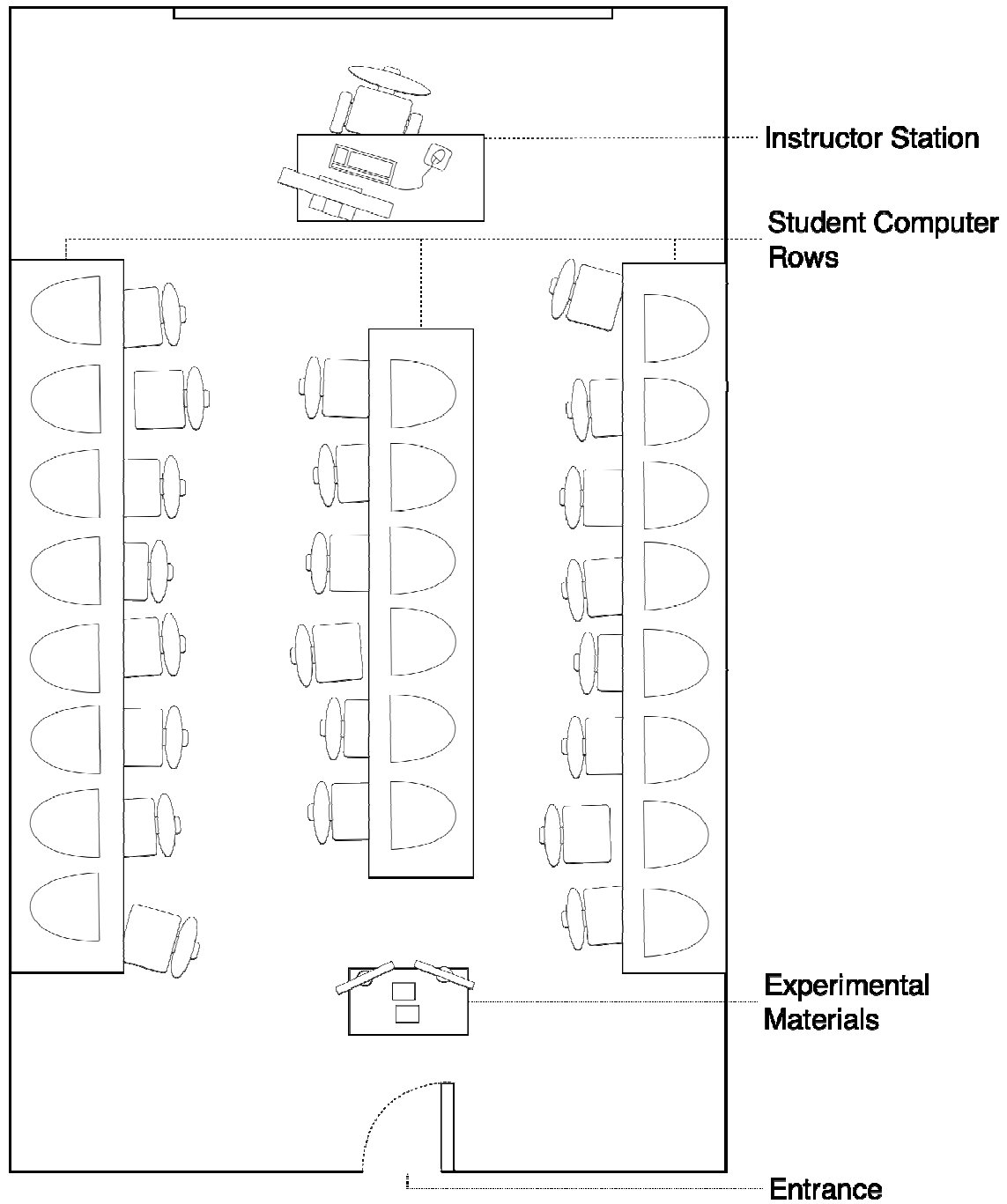
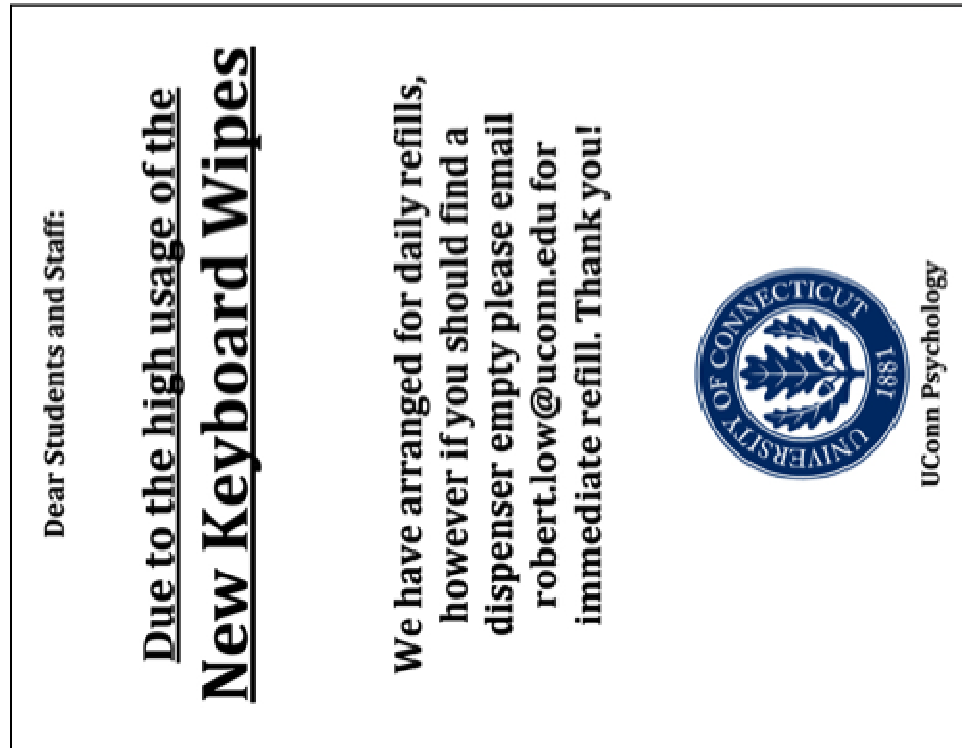


Figure 3: Floor plan of computer lab classroom showing location of experimental materials (table, signs, and boxes of wipes).

(Experimental):



(Control:)

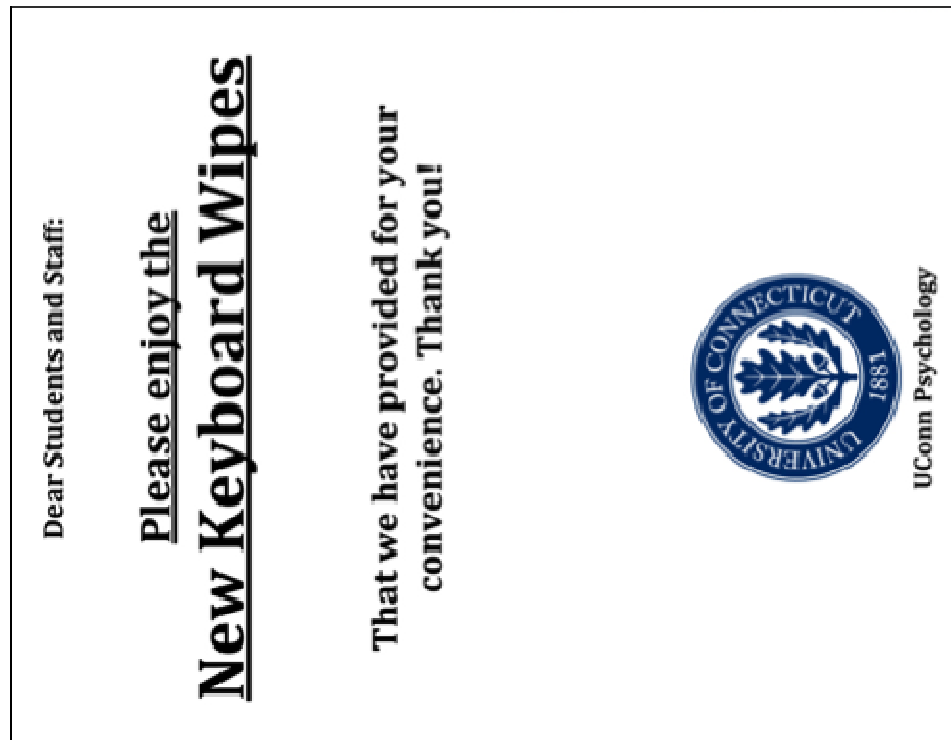


Figure 4: The two versions of the **descriptive-norm** sign

(Experimental:)



(Control:)



Figure 5: The two versions of the **injunctive-norm** sign.

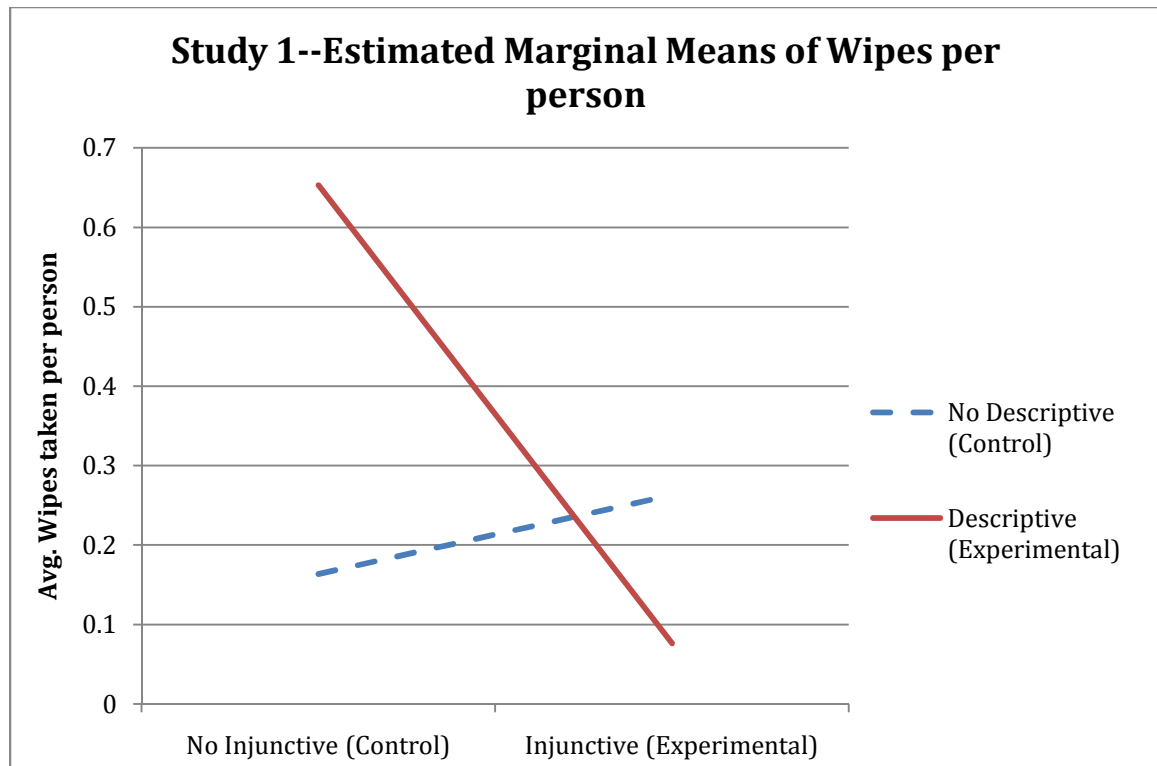


Figure 6: Average wipes taken per person in study 1.

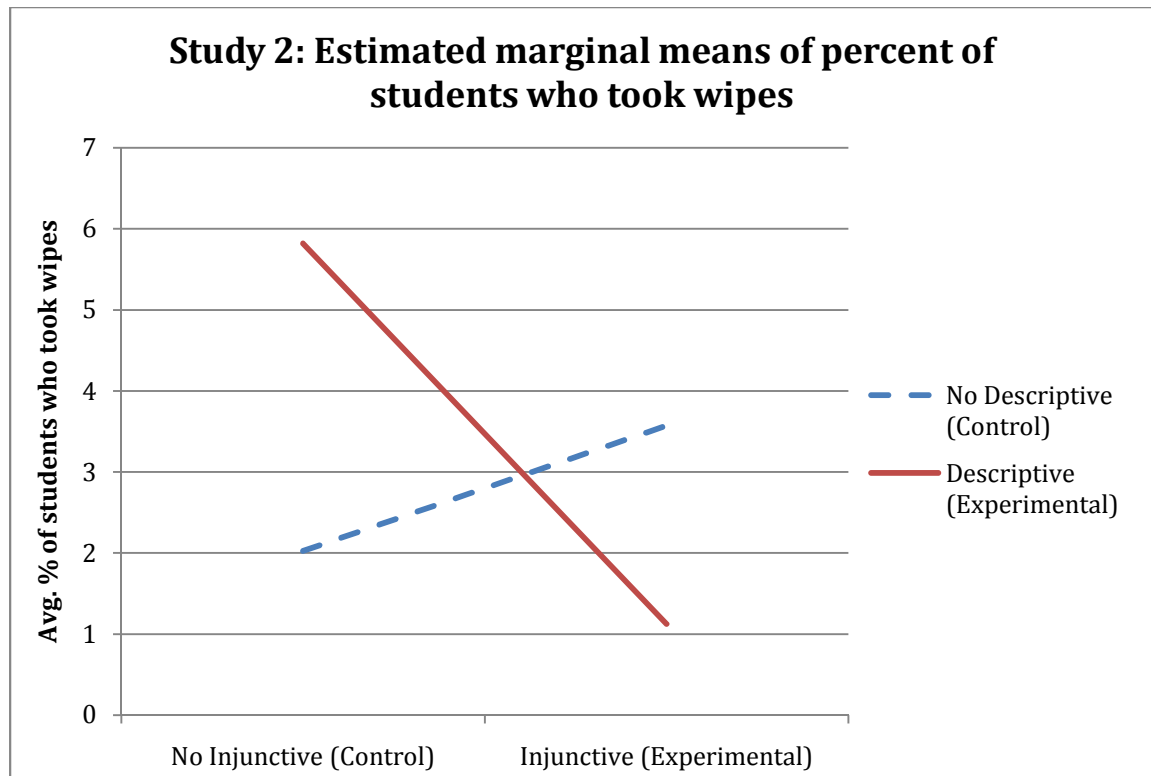


Figure 7: Average percent of students who took wipes in study 2.

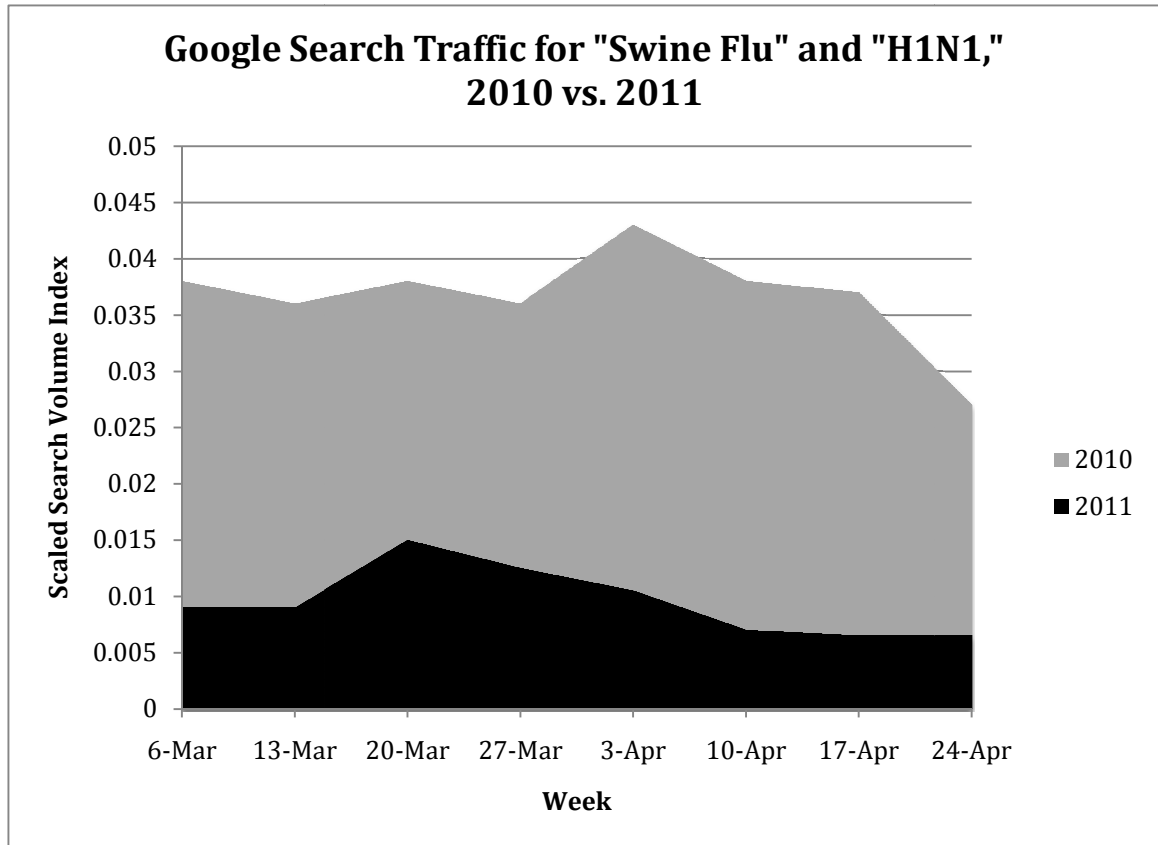


Figure 8: Google searches for “swine flu” and “H1N1” decreased by 74% from 2010 to 2011.

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